Trend Study 17-25-02

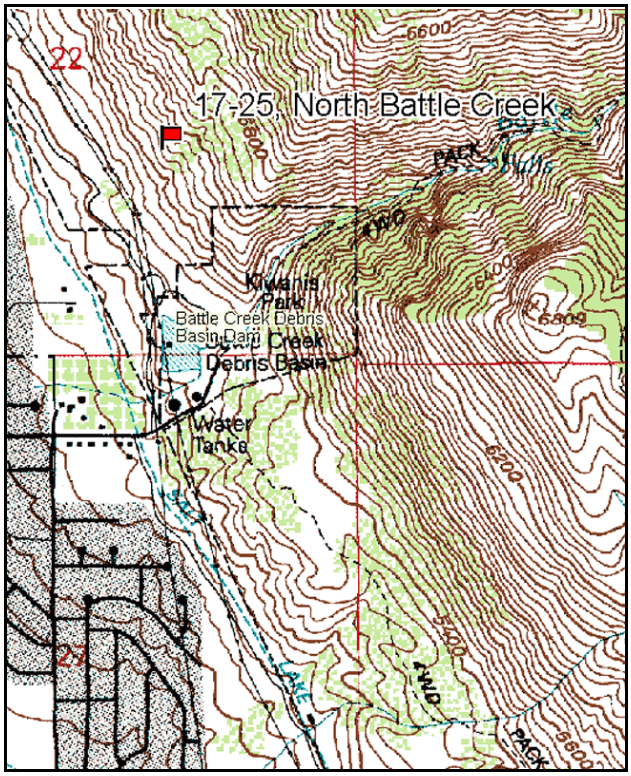
Study site name: North Battle Creek. Vegetation type: Stansbury Cliffrose.

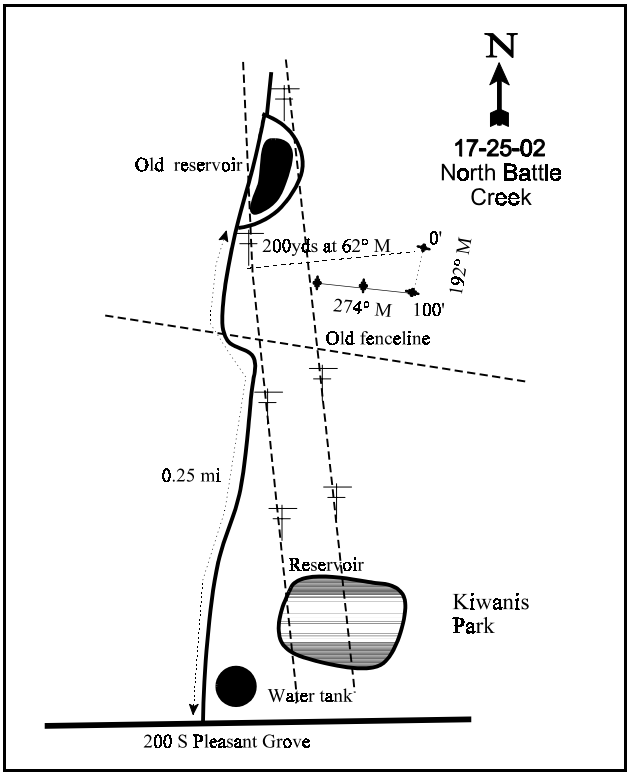
Compass bearing: frequency baseline 192 degrees magnetic (lines 2 & 3 @ 274°M).

Frequency belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (34 & 71ft). Rebar: None on site.

LOCATION DESCRIPTION

From Pleasant Grove, go up 200 South towards Battle Creek Canyon. The paved road ends at a water tank. Follow one of the many dirt roads north along the base of the foothill under the powerlines. From the water tank, go about 1/4 mile to a 2nd reservoir. Stop on the south end. From the powerline pole on the south end of the old reservoir, the 0-foot stake is about 200 yards at 62 degrees magnetic. The study samples the first face or slope below the second terrace, in a fairly dense cliffrose type, just north of a small drainage. A red browse tag, #3988, is attached to the 0-foot stake.





Map Name: Orem

Diagrammatic Sketch

Township 5S, Range 2E, Section 22

GPS: NAD 27, UTM 12S 4438640 N 440412 E

DISCUSSION

North Battle Creek - Trend Study No. 17-25

This study is found on a steep (65-70%) southwest facing hillside located just north of Battle Creek above Pleasant Grove. The site is typical of the severe winter range in this area. Elevation is about 5,600 feet which is between the upper and lower Bonneville lake terraces. The Battle Creek and Grove Creek debris basins, which act as small reservoirs in the spring, are located below the site to the north and south. Residential subdivisions have been constructed up to the base of the hill just below the site. The range type is tall cliffrose with sagebrush-grass in the understory. Above the study sight, Gambel oak becomes increasingly dominant. The area is moderately browsed by deer. A pellet group transect read on site in 2002 estimated 44 deer days use/acre (109 ddu/ha). Only one elk pellet group was encountered. All pellet groups appeared to be from winter use.

Soil is a well drained clay loam derived from limestone and quartzite. Soils in this area often have a lime-cemented hardpan at 12 to 20 inches depth, which can be a barrier to root and water penetration. (USDA-SCS, 1972). Soil at the site has an effective rooting depth is nearly 13 inches with a neutral soil reaction (pH of 7.1). Both phosphorous and potassium are low at only 6.4 ppm and 38.4 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium may limit normal plant growth and development. On steep slopes, such as this study site, the erosion hazard is severe. There is a moderate amount of exposed bare ground and some erosion is occurring. The erosion condition class was determined to be slight in 2002.

The key browse species is Stansbury cliffrose. It provided 86% of the browse cover in 2002. Use has consistently been moderate to heavy since the site was established in 1983. Density was estimated at 800 plants/acre in 1997 with the larger sample used that year. Vigor was generally good and only 10% of the population was classified as decadent. No recruitment was evident with no seedlings or young sampled between 1983 and 1997. Density declined slightly to 720 plants/acre in 2002. About one-third of the population was classified as decadent and 36% of the decadent plants appeared to by dying (>50% crown death). Recruitment and biotic potential remains poor with only 1 seedling sampled in 2002.

Mountain big sagebrush provides some additional forage. It had a low density of only of 220 plants/acre in 1997, declining to 120 in 2002. It displayed moderate to heavy use in 1997 and moderate use in 2002. Vigor was good on most plants and the number of decadent plants remains low. A small number bitterbrush provide additional preferred forage.

Perennial herbaceous plants are severely depleted. Occasional clumps of bluebunch wheatgrass and Sandberg bluegrass are the principal grasses. Cheatgrass is also abundant. Also numerous are annual forbs like: storksbill, bur buttercup, and pale alyssum. The most desirable forb on the site was Utah sweetvetch, but it was not sampled in 1997. It is possible that this was misidentified in 1997 as *Lathyrus brachycalyx*. Another forb of interest is desert princes plume, a species normally regarded as a selenium indicator.

1983 APPARENT TREND ASSESSMENT

This site is located on a highly erodible and very steep slope. Litter and vegetation cover primarily result from annual plants. Because of these facts, the rate of erosion is high. The area has the appearance of a declining sagebrush population that is being replaced by annual grasses and weeds. However, the collected data appears to contradict this and is more indicative of a stable browse stand. The density plot sample is a small one and there is some question as to validity. It is more likely that big sagebrush is declining in abundance much as it is elsewhere along the Wasatch Front.

1989 TREND ASSESSMENT

Trend for soil is stable. The lower amount of litter cover calculated in 1989 may be a reflection of the dry conditions. More rock and pavement is exposed, 29% in 1983 compared to 46.5% in 1989. However, vegetation cover increased and cover of bare ground declined slightly. Trend for browse is stable with similar population densities for cliffrose and sagebrush estimated in 1989. Utilization is moderate for both species but vigor is good on most plants and rates of decadence are within acceptable limits. Trend for the herbaceous understory is also stable. Herbaceous vegetation is limited but sum of nested frequency for perennial grasses and forbs has remained similar.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

1997 TREND ASSESSMENT

Soil trend is stable. Past erosion is apparent with some terracing and plant pedestalling. Erosion does not appear to be very active now. Vegetation and litter provide some soil protection, but a bulk of the basic ground cover is provided by rock and pavement. The browse trend is stable as well. Populations appear to be relatively stable and not expanding. A greatly increased sample size was used in 1997 which accounts for some of the shifts in densities. Utilization has increased on cliffrose and mountain big sagebrush. The herbaceous understory is depleted with a bulk of the cover coming from annual species. Bluebunch wheatgrass nested frequency has significantly declined since 1989. Herbaceous understory trend is slightly downward.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly downward (2)

2002 TREND ASSESSMENT

Trend for soil is slightly down. Vegetation and litter cover declined and cover of bare ground increased. There is some erosion occurring but is not severe. The erosion condition class was determined to be slight. Trend for browse is down slightly. Cliffrose has declined slightly in density. Utilization is not as heavy but the number of decadent plants has increased from 10% to 31%. In addition, 36% of the decadent cliffrose sampled were classified as dying. No young plants occur on the site and only one seedling was encountered within the sample. Mountain big sagebrush occurs in low densities. Sagebrush density has declined 45% to only 120 plants/acre. Use is moderate but vigor is normal. Trend for the herbaceous understory is stable but poor. Sum of nested frequency of perennial grasses has remained stable. Cheatgrass was common in 1997 but has since declined significantly in nested frequency due to drought. The forb composition is still dominated by annual weeds but the sum of nested frequency for perennial forbs has remained stable.

TREND ASSESSMENT
soil - down slightly (2)
browse - down slightly (2)
herbaceous understory - stable but poor (3)

HERBACEOUS TRENDS --
Herd unit 17 , Study no: 25

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'83	'89	'97	'02	'83	'89	'97	'02	'97	'02
G	Agropyron cristatum	-	-	1	7	-	-	1	2	.00	.18
G	Agropyron spicatum	$_{b}$128	$_{b}$117	$_{a}$65	$_{a}$71	46	44	26	30	3.48	3.71
G	Bromus tectorum (a)	-	-	$_{b}$159	$_{a}$38	-	-	59	18	2.51	.24
G	Poa bulbosa	-	-	-	2	-	-	-	1	-	.00
G	Poa secunda	$_{b}$15	$_{b}$13	$_{ab}$6	$_{a}$-	5	5	2	-	.18	-
G	Secale cereale (a)	-	-	2	-	-	-	1	-	.00	-
G	Unknown grass - perennial	-	3	3	-	-	2	1	-	.03	-
Total for Annual Grasses		0	0	161	38	0	0	60	18	2.51	0.24
Total for Perennial Grasses		143	133	75	80	51	51	30	33	3.70	3.90
Total for Grasses		143	133	236	118	51	51	90	51	6.22	4.14
F	Alyssum alyssoides (a)	$_{a}$-	$_{a}$-	$_{b}$81	$_{b}$60	-	-	35	25	.30	.30
F	Allium spp.	$_{a}$20	$_{a}$6	$_{a}$16	$_{b}$121	9	4	10	50	.08	.86
F	Ambrosia psilostachya	$_{a}$-	$_{a}$-	$_{b}$13	$_{a}$1	-	-	7	1	.21	.00
F	Artemisia ludoviciana	-	-	5	-	-	-	3	-	.30	-
F	Astragalus spp.	-	-	-	1	-	-	-	1	-	.03
F	Cirsium undulatum	-	-	1	2	-	-	1	1	.00	.03
F	Convolvulus arvensis	$_{a}$-	$_{a}$-	$_{ab}$11	$_{b}$14	-	-	4	6	.36	.49
F	Epilobium brachycarpum (a)	-	-	4	7	-	-	2	5	.01	.02
F	Erodium cicutarium (a)	-	-	$_{b}$213	$_{a}$91	-	-	71	43	6.43	1.01
F	Galium aparine (a)	-	-	$_{a}$59	$_{b}$99	-	-	27	36	.84	2.61
F	Hackelia patens	$_{a}$-	$_{a}$-	$_{b}$14	$_{b}$10	-	-	5	5	.05	.07
F	Hedysarum boreale	$_{b}$57	$_{b}$52	$_{a}$-	$_{a}$7	25	21	-	3	-	.01
F	Lathyrus brachycalyx	$_{a}$-	$_{a}$-	$_{c}$111	$_{b}$58	-	-	42	27	4.23	2.51
F	Lactuca serriola	$_{a}$-	$_{a}$-	$_{b}$17	$_{a}$1	-	-	11	1	.16	.00
F	Machaeranthera canescens	2	1	-	-	1	1	-	-	-	-
F	Medicago sativa	-	-	3	-	-	-	1	-	.03	-
F	Oenothera latifolia	2	-	-	-	1	-	-	-	-	-
F	Phlox longifolia	6	13	11	9	3	9	5	5	.05	.05
F	Ranunculus testiculatus (a)	-	-	$_{b}$166	$_{a}$124	-	-	60	47	1.64	.95
F	Sisymbrium altissimum (a)	-	-	3	4	-	-	1	2	.00	.01
F	Stanleya pinnata	$_{b}$24	$_{b}$12	$_{a}$-	$_{a}$-	10	9	-	-	-	-
F	Taraxacum officinale	-	-	6	2	-	-	4	1	.07	.03
F	Tragopogon dubius	$_{a}$-	$_{a}$-	$_{b}$18	$_{b}$16	-	-	8	7	.11	.08
F	Unknown forb-annual (a)	-	-	$_{a}$1	$_{b}$44	-	-	1	19	.15	1.33
Total for Annual Forbs		0	0	527	429	0	0	197	177	9.38	6.26
Total for Perennial Forbs		111	84	226	242	49	44	101	108	5.66	4.19
Total for Forbs		111	84	753	671	49	44	298	285	15.05	10.46

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Herd unit 17 , Study no: 25

Type	Species	Strip Frequency '97	Strip Frequency '02	Average Cover % '97	Average Cover % '02
B	Artemisia tridentata vaseyana	8	5	.83	.36
B	Chrysothamnus nauseosus albicaulis	2	2	.78	.38
B	Cowania mexicana stansburiana	32	26	7.41	8.80
B	Gutierrezia sarothrae	12	6	.56	.39
B	Purshia tridentata	0	4	-	.30
Total for Browse		54	43	9.59	10.23

CANOPY COVER --
Herd unit 17 , Study no: 25

Species	Percent Cover '97	Percent Cover '02
Artemisia tridentata vaseyana	-	3
Cowania mexicana stansburiana	2	2

Key Browse Annual Leader Growth
Herd unit 17 , Study no: 25

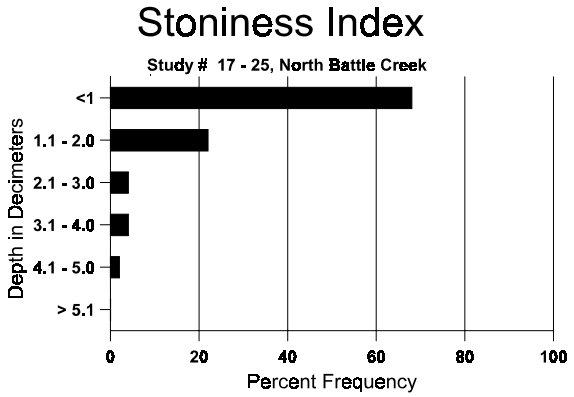
Species	Average leader growth (in) '02
Cowania mexicana stansburiana	1.1

BASIC COVER --
Herd unit 17 , Study no: 25

Cover Type	Nested Frequency '97	Nested Frequency '02	Average Cover % '83	Average Cover % '89	Average Cover % '97	Average Cover % '02
Vegetation	342	289	3.50	7.00	30.84	26.16
Rock	318	340	8.75	20.50	28.40	32.22
Pavement	286	311	20.25	26.00	11.94	9.89
Litter	371	333	48.75	30.50	19.88	15.82
Cryptogams	5	5	.75	.25	.01	.04
Bare Ground	248	277	18.00	15.75	16.89	27.09

SOIL ANALYSIS DATA --
Herd Unit 17, Study no: 25, North Battle Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.7	52.3 (15.4)	7.1	28.0	33.4	38.6	2.9	6.4	38.4	.6



PELLET GROUP FREQUENCY --
Herd unit 17 , Study no: 25

Type	Quadrat Frequency	
	'97	'02
Elk	-	1
Deer	47	18

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
'02	'02
9	1 (2)
574	44 (109)

BROWSE CHARACTERISTICS --
Herd unit 17 , Study no: 25

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	83	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	13	-	-	-	-	-	-	-	-	13	-	-	-	866	20	35	13
	89	-	12	-	-	-	-	-	-	-	11	-	1	-	800	22	26	12
	97	-	3	5	-	1	-	-	-	-	9	-	-	-	180	26	40	9
	02	-	5	-	-	-	-	-	-	-	5	-	-	-	100	28	46	5
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	3	-	-	-	-	-	-	-	3	-	-	-	200			3
	97	1	-	1	-	-	-	-	-	-	-	-	-	2	40			2
	02	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	- 6%
'89	100%	00%	07%	-78%
'97	36%	55%	18%	-45%
'02	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	1066	Dec:	0%
	'89	1000		20%
	'97	220		18%
	'02	120		17%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus albicaulis																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66	23	30	1
	89	-	1	-	-	-	-	-	-	-	1	-	-	-	66	20	37	1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	22	30	1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	33	0
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	-	-	-	2	40			2
	02	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+ 0%
'89	100%	00%	00%	- 9%
'97	00%	00%	67%	-33%
'02	00%	00%	50%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	66	Dec:	0%
	'89	66		0%
	'97	60		67%
	'02	40		50%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cowania mexicana stansburiana																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	83	-	3	-	-	-	1	-	-	-	3	-	1	-	266	50	60	4
	89	-	4	-	-	-	-	-	-	-	4	-	-	-	266	58	59	4
	97	-	4	14	-	-	18	-	-	-	36	-	-	-	720	50	57	36
	02	-	-	13	-	4	4	4	-	-	25	-	-	-	500	54	63	25
D	83	-	-	1	-	-	-	-	-	-	-	-	1	-	66			1
	89	-	1	1	-	-	-	-	-	-	2	-	-	-	133			2
	97	-	-	3	-	-	1	-	-	-	3	-	-	1	80			4
	02	-	-	3	-	-	1	7	-	-	7	-	-	4	220			11
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	60%	40%	40%	+17%
'89	83%	17%	00%	+50%
'97	10%	90%	03%	-10%
'02	11%	58%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	332	Dec:		20%
'89	399			33%
'97	800			10%
'02	720			31%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	37	-	-	-	-	-	-	-	-	37	-	-	-	740	9	11	37
	02	3	-	-	-	-	-	-	-	-	3	-	-	-	60	7	15	3
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	1	-	-	-	-	-	3	-	-	1	-	-	3	80			4
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	-84%
'02	00%	00%	43%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	0%
	'89	0		0%
	'97	860		0%
	'02	140		57%

Purshia tridentata																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	02	-	-	2	-	1	-	-	-	-	3	-	-	-	60	13	8	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	
'02	25%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'97	0		-
	'02	80		-